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ENDANGERED SPECIES IN AUSTRALIA

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CHARACTERISTICS OF THE AUSTRALIAN FLORA AND FAUNA

The plants and animals of terrestrial Australia are very different from those of other continents. Australia's origins in Gondwana and long isolation from the rest of the world have allowed the evolution of many groups not found in other countries, or uncommon elsewhere. Obvious examples include the eucalypts which dominate much of the landscape, and the wide variety of marsupials. Australia and New Guinea form a distinct biogeographic region.

The marine plants and animals, on the other hand, show many similarities to those of nearby oceans and shores. Because of Australia's size and location there are a great number of marine species in Australian seas.

The flora and fauna of Australia and its external territories are characterised by high natural diversity, high endemism (species that occur nowhere else) and particular susceptibility to extinctions and declines.

High natural diversity

For example there are:

- at least 18,000 species of vascular plants and over 12,000 species of non-vascular plants (mosses, algae, lichens, fungi);
- about 850 species of birds;
- about 700 species of reptiles, including approximately 300 species of skinks; the reptile fauna of Australian deserts is the richest in the world;
- about 54,000 known species of insects, with at least as many species remaining to be identified and described; and
- about 3,600 species of fish and tens of thousands of species of molluscs; the flora and fauna of Australian coastal waters being among the most species-rich and diverse on earth.

High endemism

- about 33 per cent of genera and 85 per cent of species of vascular plants are endemic;
- all the living species of monotremes (platypus and echidnas) are found only in Australia and New Guinea;

- 89 per cent of marsupials and 73 per cent of other mammals are endemic;
- about 70 per cent of bird species are endemic; ·
- 88 per cent of reptiles and 94 per cent of frogs occur nowhere else; the Pygopodidae (legless lizard family) is confined to Australia and New Guinea; ·
- the inland aquatic fauna has a very high level of species endemism; and ·
- there is a very high degree of endemism in the marine flora and fauna of the southern coast of Australia.

Susceptibility to extinctions and declines

Since European settlement began, just over 200 years ago, 18 species of mammals and about 100 species of vascular plants have become extinct. Currently about 40 species of mammals and many hundreds of species of plants are threatened with extinction. These figures are the worst in the world.

In relation to susceptibility to extinction, Australia has suffered rates of extinction more like those of small islands, than those of other continents.

EXTINCTION AND ENDANGERED SPECIES IN AUSTRALIA

Extinction is a natural evolutionary process. Nowadays, however, most extinctions are caused by humans. The most obvious difference between natural evolutionary extinctions and those induced by people is the rate. The current rate is much higher than the background natural rate and will increase further unless action is taken now.

Australia unfortunately provides too many striking examples of an increased rate of extinction since the arrival of Europeans. In only 200 years, 18 species of endemic mammals have become extinct (7 per cent of the total). This is half of all the mammal species that have become extinct worldwide in historical times.

About 100 species of vascular plants, 0.8 per cent of the total, have become extinct, the overwhelming majority having occurred in areas cleared for farming. Of the plant species presumed extinct in Western Australia (1.4 per cent of the State's flora), 90 per cent occurred in the agricultural lands of the south-west corner of the State. It is likely that some species of plants disappeared before they could be collected and named by scientists. These data compare unfavourably with only 27 extinct plant species in the whole of Europe (0.2 per cent), 39 in southern Africa (0.2 per cent) and 74 in continental USA (0.4 per cent).

An endangered species is one that could become extinct in the wild in 10 to 20 years, if nothing is done to protect it. Recent reviews suggest that about 40 species of mammals (16 per cent of living species) are threatened with extinction and that 209 species (1.4 per cent) of vascular plants are endangered with a further 784 species (5.2 per cent) being vulnerable.

The national figures for extinct and threatened species, shocking though they are, do not indicate the extent to which local diversity has been lost in large areas of the country. Many species are clinging to existence in small areas and may not be classified as threatened nationally, even though they are no longer found throughout their former range.

On a regional basis, extinctions have been much higher in some areas than in others. In the deserts, for example, 33 per cent of the mammal species are extinct and 90 per cent of all

mammal species with an adult body weight between 35 grams and 5,500 grams are either extinct or endangered. The number of endangered plants is highest in the agricultural areas of the south-east and south-west, the east coast and in the rainforests of north Queensland. Victoria alone recognises 400 plant species as being 'at risk', compared with the national figure of 209 species classified as endangered.

Extinction continues. The extinct mammals, for example, did not all disappear last century. Recent studies have shown that most extinctions have occurred in the past 40 to 50 years. The ranges of many species continue to shrink.

CAUSES OF EXTINCTION

Several processes have led to species becoming extinct or endangered. Often because extinctions happened some time ago and were not studied at the time, the exact reason for the loss of a particular species is not known. In many cases there were probably several compounding reasons. Some accepted reasons for species extinctions are shown below.

Habitat destruction

Clearing of habitat for agriculture and urban or other developments is a major cause of extinctions in Australia. Most species cannot exist outside a natural or semi-natural ecosystem. Besides broadscale clearing, fragmentation of habitat can lead to the loss of species from habitat remnants. This occurs when the remnants are too small to support a viable population, when a population disappears from a remnant because of a local event (e.g. a fire) and the species cannot re-invade across farmland. or when the remnant supports a plant population but not its pollinator.

Habitat change and degradation

Among the most obvious causes are changed fire regimes, salination, drainage, erosion, grazing by introduced herbivores (both domestic and feral) and the presence of environmental weeds (both from outside Australia and from other parts of Australia). Probably the least understood of these relate to fire. Most Australian plants and animals are well adapted to survive fire. However, in many parts of Australia there have been major changes between fire regimes resulting from Aboriginal land management practices and those followed by Europeans. It is these changed fire regimes (fire frequency, intensity, season, pattern, size) that have led to species disappearing. The management of some endangered species, for example the ground parrot, involves the application of appropriate fire regimes.

Introduced animals

Australia has a large number of introduced mammals and birds, an introduced frog and a few introduced invertebrates that have caused, or have the potential to cause, extinction of native species. Introduced herbivores that have become feral and caused significant environmental degradation include rabbits, goats, cattle, buffalo, pigs, donkeys and camels. Introduced rats and mice are also common in some areas. Feral honey bees are now widespread in Australia. Cane toads have recently spread from Queensland into the Northern Territory. Two exotic predators, cats and European red foxes, are now abundant and recent studies have shown that foxes are implicated in the disappearance of remnant populations of endangered mammals and may be affecting ground-dwelling birds such as the malleefowl. The presence of exotic species can lead to changed competitive relationships to the detriment of native species.

Introduced plants

Environmental weeds have replaced and are replacing native plants over wide areas. Examples

include the invasion of exotic grasses into many areas of remnant vegetation in south-west Australia, the invasion of the annual herb **Carrichtera annua** over much of the Nullarbor Plain, the replacement of river gums with Athel trees (**Tamarix aphylla**) in river courses in central Australia, the spread of **Mimosa pigra** shrub into many tropical wetlands, the choking of some swamps by the floating fern **Salvinia** and the invasion of the boneseed shrub (**Chrysanthemoides monilifera**) into large areas of south-east Australia. Introduced plants, including Australian plants from other parts of the continent, both displace native plants and eliminate native animal species not adapted to using them for food or shelter.

Direct exploitation

No vertebrate species are thought to have become extinct solely because of hunting in Australia, but hunting, fishing and collecting for trade have the potential to cause extinctions of rare or localised species. The uncontrolled collection of plants for the wildflower trade or for horticulture also has the potential to cause extinctions.

Interactions of causes

A combination of factors, rather than a single factor, may finally tip the scales against some species. For example, the smaller wallabies are more vulnerable to predation when fire opens up their habitat or when populations are fragmented by habitat clearing or degradation. Remnant populations of mammals in deserts or on farmland may be affected by predators such as foxes, when rabbits become abundant enabling fox numbers to build up.

CONSERVATION OF ENDANGERED SPECIES

Because most Australian species are found nowhere else, Australians have a special responsibility to conserve them. In addition, Australia has a responsibility to conserve the many species that are shared with other countries. The best known examples of shared species are probably the migratory wading birds that breed in Siberia and other places in the northern hemisphere and spend the northern winter in Australia.

Many marine species that are distributed throughout parts of South-East Asia and the Pacific also occur in Australia. Some of these have been over-exploited outside Australian waters and Australia offers the best chance for their long-term conservation. Examples include mangrove trees, marine turtles, dugong, saltwater crocodiles and trochus shells.

The high standard of living, relatively low human population, strong economy and stable political situation make it possible for Australians to conserve species without many of the problems faced by other countries.

All Australian governments have adopted the World Conservation Strategy developed by the World Conservation Union (IUCN) in 1980. A National Conservation Strategy has been developed (1983) and endorsed by the Commonwealth, Western Australia, South Australia, New South Wales and the Northern Territory. Two States have prepared State Conservation Strategies.

The objectives of the National Conservation Strategy for Australia are to:

- maintain essential ecological processes and life-support systems;
- preserve genetic diversity;
- ensure the sustainable utilisation of species and ecosystems; and

- maintain and enhance environmental qualities.

Each of these four objectives depends on the maintenance of biological diversity, that is, the conservation of the species of plants, animals and micro-organisms of the world.

The European settlement and development of Australia, while providing considerable economic benefits, has come at a cost to the flora and fauna. Past land use decisions resulted in massive habitat destruction and degradation and consequent loss of species. These processes are continuing. Conserving threatened species will obviously cost money now. Integrating conservation objectives with land use decision-making is essential if these endangering processes are to be reversed. Conservation also makes good economic sense in the long term.

There are many reasons for the conservation of species.

The first is that compassion demands their preservation. Compassion develops from the view that other species have a right to exist; the needs and desires of humans should not be the only basis for ethical decisions.

The second reason is based on aesthetic and cultural values. Species should be preserved because of their beauty, symbolic value or intrinsic interest. Kangaroos and other larger mammals, wildflowers of striking beauty and butterflies of iridescent hue appeal automatically to most members of our society and we would feel a loss if they and the wild places they live in disappeared. The extinction of species reduces the richness of potential human experience.

The third is based on the economic benefits of biodiversity. Plants, animals and micro-organisms provide all our food, and many of our medicines and drugs, as well as renewable resources such as fuel, building materials, paper and leather. They are an essential resource for developing biological control of pests and diseases. The unique Australian flora and fauna, and the scenery they help create, also attract tourists.

So far only a minute proportion of the economic potential of Australian plants and animals has been realised. An example of this potential is the eucalypts now planted as cash crops throughout the subtropics of the world. Many other biological resources, including species considered 'useless' today, will be found to have new values in the future. Clearly, extinctions reduce our future options.

The fourth reason is that other species are vital components of ecosystems that provide us with indispensable free services - the life support systems of our planet. Other species provide the oxygen we breathe, maintain the quality of the atmosphere, control and ameliorate the climate, regulate fresh water supplies, generate and maintain the topsoil, dispose of wastes, generate and recycle nutrients, control pests and diseases, pollinate crops and provide a genetic store from which we can benefit in the future. The contribution of the rarer species to the provision of life-support systems is poorly understood. However, some rarer species may be important in the recovery processes following ecosystem disturbance. Change in the future is inevitable and likely to be rapid. Today's rare plant and animal species may become tomorrow's keystone species as conditions change.

In addition to the above reasons, many Australians wish to conserve the plants and animals of their country because of pride in their natural heritage.

It is also important to maintain the full range of genetic diversity within individual species. Small populations lose genetic diversity over time. Without genetic variability a species cannot evolve or adapt to changing environments, and it is vulnerable to new conditions such as climatic change or new diseases. Adequate levels of genetic diversity can only be maintained if species

are conserved as viable populations in the wild - zoos and botanic gardens can assist this process, not replace it. The rapidly developing techniques of the new science of biotechnology also depend on genetic diversity.

RESPONSIBILITY FOR ENDANGERED SPECIES CONSERVATION

The conservation of endangered species is the responsibility of all levels of government and the wider community.

The States, through their constitutional responsibility for land use and management, are the major participants, and States and Territories have passed some legislation relating to wildlife conservation.

Over the past few years the Commonwealth Government has taken a number of initiatives in endangered species conservation, firstly through Australian participation in international treaties, especially the Convention on Trade in Endangered Species (CITES), and then via financial assistance to the States and other organisations involved in endangered species conservation. National coordination has been through the Council of Nature Conservation Ministers (CONCOM).

In 1988 the Commonwealth Minister for the Arts, Sport, the Environment, Tourism and Territories established an Endangered Species Advisory Committee (ESAC) with the following objectives:

- to develop a national strategy that will seek to conserve endangered wildlife (plants and animals) and their habitats and prevent further species becoming endangered. The strategy will provide a guide for all policy and decision makers, and the public, on matters relating to endangered species;
- to promote management practices that ensure the recovery of endangered species and ensure that no further species become endangered;
- to provide a national forum for the discussion of relevant matters; and
- to provide advice to the Commonwealth Minister for the Arts, Sport, the Environment, Tourism and Territories.

The Endangered Species Advisory Committee comprises representatives from the Commonwealth Government, CONCOM, non-government organisations involved in conservation, scientific/research institutions and the rural community.

In July 1989 the Prime Minister announced the establishment of an Endangered Species Unit within the Australian National parks and Wildlife Service. The Endangered Species Program was allocated \$2 million for each of the first two years of a ten year program. The Endangered Species Unit provides technical and secretariat support to the ESAC.

HOPE FOR THE FUTURE

The trend towards increasing rates of extinction can be reversed and recent positive initiatives and actions have occurred.

Some national parks and other conservation reserves have been declared primarily to protect certain endangered species. For example, in New South Wales the Queanbeyan Nature Reserve protects the endangered button wrinkle wort daisy, **Rutidosis leptorhynchoides**. In Western Australia the recently declared beekeepers Road Nature Reserve protects the endangered

hidden beard-heath, **Leucopogon obtectus** and the new Babakin Nature Reserve protects the endangered underground orchid, **Rhizanthella gardneri**.

The population decline of many endangered species has been reversed by the application of research results. Animal species rescued from the brink of extinction include the numbat, northern hairy-nosed wombat, noisy scrub-bird, Lord Howe Island woodhen and the orange-bellied parrot. Research into important factors like fire and the impact of introduced animals has led to improved management regimes.

Special legislation for endangered species has already been enacted in Victoria and is proposed for New South Wales. Endangered plants legislation has been passed in Western Australia.

Australians now need to make a commitment to further develop these initiatives so as to maintain our rich and diverse wildlife heritage.

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